

PRVPATENT- OCH REGISTRERINGSVERKET
Patentavdelningen

EP 00 / 977

RECD 21 MAR 2000

**Intyg
Certificate**

Härmed intygas att bifogade kopior överensstämmer med de handlingar som ursprungligen ingivits till Patent- och registreringsverket i nedannämnda ansökan.

This is to certify that the annexed is a true copy of the documents as originally filed with the Patent- and Registration Office in connection with the following patent application.

(71) Sökande BTG Eclepens SA, Eclepens CH
Applicant (s)

(21) Patentansökningsnummer 9900564-7
Patent application number

(86) Ingivningsdatum 1999-02-18
Date of filing

Stockholm, 2000-02-01

För Patent- och registreringsverket
For the Patent- and Registration Office

Emma Johnsson
Emma Johnsson

Avgift
Fee 170:-

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH
RULE 17.1(a) OR (b)

**PATENT- OCH
REGISTRERINGSVERKET
SWEDEN**

Postadress/Adress
Box 5055
S-102 42 STOCKHOLM

Telefon/Phone
+46 8 782 25 00
Vx 08-782 25 00

Telex
17978
PATOREG S

Telefax
+46 8 666 02 86
08-666 02 86



AWAPATENT

Kontor/Handläggare
Stockholm/Tore Burman/LFG

BTG ECLEPENS S.A.
Ansökningsnr Referens
SE-2998012

1

A PROCESS FOR THE MANUFACTURE OF SOFT TIPPED BLADES.

Technical field

The present invention relates to processes for the manufacture of coating or doctoring blades comprising a band of steel or other form-stable material and a wear-resistant coating applied onto said band along a longitudinal edge section thereof subject to wear.

Background of the invention

Coating or doctoring blades tipped with rubbery or soft material are presently prepared only by moulding in a closed mould in which a band of steel or other form-stable material is placed and constitutes substrate for the coating. A liquid mix of components is injected at the lower end of a preheated mould until it appears at the opposite upper end. Care has to be taken to prevent introduction of air bubbles in the liquid material and no leakage from the mould must occur. A demoulding agent, generally based on silicones, is applied on the mould surfaces to prevent sticking of the cured material. Once filled, the mould is introduced into a circulated air oven at 80-110°C until curing has taken place so that the blades can be demoulded. This takes generally 45 to 180 minutes. After demoulding the blades are post-cured at 80-110°C for 12-24 hours.

This batch process is associated with several disadvantages, among which the main drawbacks are:

- the process encounters low productivity;
- each new blade geometry and blade length requires a new mould;
- the mould manufacturing costs are high, especially for large moulds with complex profiles;
- the larger the mould, the larger the oven necessary to preheat the mould and to cure the rubbery or soft ma-

- there are limitations in blade length because of difficulties in filling the mould without defects occurring, the need for longer pot-lives and lower viscosities, increasing mould weight, time to open, close and clean the mould etc.

Brief summary of the invention

Another object of the invention is to provide such a process which will impart no limitations to blade length and geometry of the coated blade.

For these and other objects which will be clear from
25 the following disclosure the invention provides a con-
tinuous process for the manufacture of coating or doctor-
ing blades comprising a band of steel or other form-
stable material and a wear-resistant polymer coating app-
plied on said band along a longitudinal edge section
30 thereof subjected to wear. The process involves the fol-
lowing steps:

- © 2000 Blackwell Science Ltd, *Journal of Internal Medicine* 248: 353–360

- c) allowing the applied composition to spread out so as to reach the very extreme of said edge section and then to cure to form an elastic and tacky-free coating; and, optionally
- 5 d) post-curing the coating at an increased temperature.

According to an alternative embodiment of such continuous process the following steps are involved:

- a) providing continuous relative movement between a
10 second band of double width compared to said first band and an application and treatment station;
- b) continuously supplying at said station a fast-curing composition along a longitudinal central section of double width compared to said edge section;
- 15 c) allowing the applied composition to spread out to the desired width and then to cure to form an elastic and tacky-free coating and, optionally, post-curing the coating at an increased temperature; and
- d) longitudinally cutting said second band along the
20 middle of the coated central section thereof to form two tip-coated blades.

In the process according to the invention it is preferred to introduce before application step b) above a
25 roughening step for said edge or central section to improve the adhesion of the coating.

It is also preferred for further improving the adhesion of the coating to apply a primer before application step b) above.

30 According to a preferred embodiment of the invention the fast-curing polymer composition has a pot-life of about 5 to about 30 sec.

Among preferred fast-curing polymers there may be mentioned those selected from polyurethanes, styrene-
35 butadien polymers, polyolefins, nitrile rubbers, natural rubbers, polyacrylates, polychloroprene, thermoplastic elastomers, and polysiloxanes. It is particularly pre-

2



15

20

25

30

[illegible]

[illegible]

5

10

15

20

25

3:

3

$$499.02 \pm 0.11 \text{ eV (SCLD)} + 0.5 \text{ eV} = 500.0 \pm 0.1 \text{ eV (SCLD)} + 0.5 \text{ eV} = 500.5 \pm 0.1 \text{ eV (SCLD)}$$

10

Description of specific embodiments

20

Example I

a) Bonding agent

30

circulated air oven at 85°C for 2 hours.

b) PUR top coat

The liquid cast polyurethane composition used to coat the blade is applied on top of the bonding agent coated strip by means of a low pressure mixing and dosing machine equipped with a device allowing to inject a catalyst directly into the mixing chamber. The 3 component PUR is formulated to an ultra fast-curing composition by injecting a highly efficient catalyst solution directly into the mixing chamber. The composition is made up of an MDI (Polyester "quasi" prepolymer having an isocyanate content of 16.4% such as *Ureflex*[®] MDQ 23165 (Baulé), a Polyester Polyol *Ureflex*[®] D20 (Baulé) and a chain extender 1,4-Butanediol (Baulé), mixed in a ratio of 100:140:10.4 respectively. The catalyst solution *Ureflex*[®] SD6 (Baulé) is introduced directly into the mixing chamber at a rate of 2% of the total output of 0.25 kg/min, providing a pot-life of approximately 15 sec and a gel time of approximately 30 sec. The liquid mix is applied at 1 cm of the edge within the 3 cm wide bonding agent strip on the substrate moving at a linear speed of 3.3 m/min. The moving substrate is wound up 4 m away from the pouring point, leaving enough time for the polyurethane to gelify and become tack-free, while using a spacer so as to prevent any surface damage of the applied Polyurethane elastomer during the winding up operation. The reel of wound up substrate and spacer is then submitted to a heat treatment in a circulated air oven at 85°C for 24 h. After cooling down, the reel is unwound and shows no deformation of the metal substrate. The fully cured polyurethane elastomer strip has a shore A hardness of 70-73 (measured on the blade), a width of 3 cm and a thickness of 2.5 mm, obtained in one pass. Finally, the blades are ground in a continuous way to the final blade geometry and cut to the desired length.

Example II

Example I is repeated using a steel band with a width of 200 mm, the area to be coated being centrally positioned and having a width of 6 cm. This area is
5 treated and coated as described in Example I and the band is then laser cut along the middle of the coated area, and tip grinding is performed to the desired blade geometry.

The invention has been described above by specific
10 examples and sequence of steps involved in the continuous process according to the invention. However, it is clear to the skilled artisan that the process can be modified in different ways without departing from the inventive concept according to the appended claims. All such modi-
15 fications are intended to be covered by said claims.

CLAIMS

1. A process for the manufacture of a coating or doctoring blade comprising a band of steel or other form-stable material and a wear-resistant polymer coating applied on said band along a longitudinal edge section thereof subjected to wear, characterized by the following steps:

- a) providing continuous relative movement between said band and an application and treatment station;
- 10 b) continuously applying at said station a fast-curing polymer composition along said edge section;
- c) allowing the applied composition to spread out so as to reach the very extreme of said edge section and then to cure to form an elastic and tacky-free coating;
- 15 and, optionally
- d) post-curing the coating at an increased temperature.

2. A process for the manufacture of a coating or doctoring blade comprising a first band of steel or other form-stable material and a wear-resistant polymer coating applied on said band along a longitudinal edge section thereof subjected to wear, characterized by the following steps:

- 25 a) providing continuous relative movement between a second band of double width compared to said first band and an application and treatment station;
- b) continuously supplying at said station a fast-curing composition along a longitudinal central section of double width compared to said edge section;
- 30 c) allowing the applied composition to spread out to the desired width and then to cure to form an elastic and tacky-free coating and, optionally, post-curing the coating at an increased temperature; and
- 35 d) longitudinally cutting said second band along the middle of the coated central section thereof to form two tip-coated blades

3. A process according to claim 1 or 2, characterized by roughening said edge or central section before application step b) to improve adhesion of the coating.

4. A process according to claim 1, 2 or 3, characterized by the application of a primer before application step b) to further improve adhesion of the coating.

5. A process according to any preceding claim, wherein said fast-curing polymer composition has a pot-life of about 5 to 30 seconds.

6. A process according to any preceding claim, wherein said polymer composition is based on a polymer selected from polyurethanes, styrene-butadien polymers, polyolefins, nitrile rubbers, natural rubbers, polyacrylates, polychloroprene, thermoplastic elastomers, and polysiloxanes.

7. A process according to claim 6, wherein said polymer is a polyurethane.

8. A process according to claim 7, wherein a 3-component liquid polyurethane composition containing a prepolymer, a polyol and a chain extender is continuously mixed with a catalyst solution and the mixture is then applied onto said band.

9. A process according to any preceding claim, wherein said polymer is applied with a width of about 5 to 40 mms and a thickness of about 1 to 3 mms.

10. A process according to any preceding claim, wherein said polymeric coating after curing is subjected to a grinding operation to obtain a desired profile.

11. A coating or doctoring blade prepared by the process according to any one of the preceding claims.

ABSTRACT

A process for the manufacture of a coating or doctoring blade comprising a band of steel or other form-stable material and a wear-resistant polymer coating applied on said band along a longitudinal edge section thereof subjected to wear, said process comprising the following steps:

- 10 a) providing continuous relative movement between said band and an application and treatment station;
- b) continuously applying at said station a fast-curing polymer composition along said edge section;
- c) allowing the applied composition to spread out so
15 as to reach the very extreme of said edge section and then to cure to form an elastic and tacky-free coating; and, optionally
- d) post-curing the coating at an increased temperature;
- 20 as an alternative to such process there can be used a blade of double width compared to said first band and continuously supplying a fast-curing composition along a longitudinal central section of double width compared to said edge section and longitudinally cutting said second
25 band along the middle of the coated central section thereof to form two tip-coated blades; and
- a coating or doctoring blade prepared by such process.

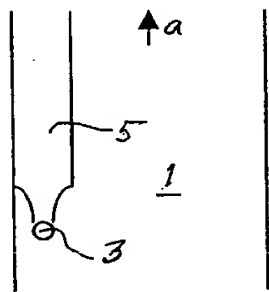


Fig.1

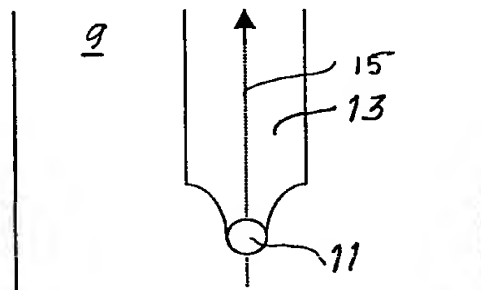


Fig.2

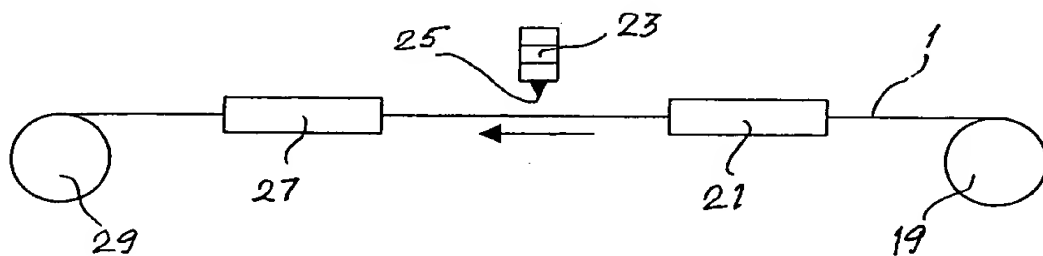


Fig.3